

Economic Incentives for Marine Vessels

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Economic Incentives Agenda

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Introduction

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- Emissions from marine vessels account for about 5% of all heavy-duty mobile source NOx emissions in the State of California
- Estimates for the next 10 years predict an increase of 20% in NOx emissions from marine vessels in the state compared to a 9% increase in NOx emissions due to onroad vehicles and reductions in NOx emissions from offroad equipment and locomotives
- Most low emission vessel project funded so far have been diesel-to-diesel repowers

Source	Current		2010	
	NOx	PM 10	NOx	PM 10
Onroad Heavy-duty Vehicle	426	23	465	14
Offroad Equipment	406	22	317	26
Marine	71	10	84	12

California
Emission
Estimates

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Carl Moyer Program

Carl Moyer Memorial Air Quality Standards Attainment Program

- The Carl Moyer Program funded 33 marine vessel projects in its first year of implementation in FY98-1999. Those projects represented reductions in NOx of 375 tons/year

Purpose	Reduce emissions from heavy-duty engines to meet goals set in the 1994 California State Implementation Plan
Eligible Vessels	All marine vessels including ferries, tug/tow/push boats, fishing boats, bulk carrier, passenger ship, forklifts, yard hostlers
Project Types	New purchases, repowers (including diesel to diesel), and retrofits
Incentive Amount	Up to \$12,000 per ton of NOx reduced. Typical ferry projects received about \$120,000
Apply to	California local Air Quality Management District (AQMD) or Air Pollution Control District (APCD)
For more information	California Air Resources Board: http://www.arb.ca.gov/msprog/moyer/moyer.htm

Carl Moyer Program Project Example: Diesel to Diesel Ferry Engine Repower



- Three funded statewide, all in the Bay Area
- 19 tons of NOx reduced annually
- Cost effectiveness is about \$1,500/ton of NOx reduced

- Typical project consists in replacing the two Detroit Diesel 12V71 engines with Detroit Diesel Series 60 engines
- Other marine projects include fishing boats and tugs



New Equipment Purchase: Electric Forklifts



- Over 100 units funded statewide, all in the South Coast
- 144 tons of NOx reduced annually (uncontrolled propane units replaced by electric units)
- Cost effectiveness is about \$2,300/ton of NOx reduced
- Typical new electric forklifts are 4,000 to 5,000 lbs. lift capacity manufactured by Yale, Crown, Nissan, or Toyota
- Large emission reductions possible because baseline for propane units is 10.5 g/bhp-hr to 12.9 g/bhp-hr and units are used in 2 to 3-shift operations

Retrofit: Diesel to LPG Yard Hostler



- Five funded statewide, all in the South Coast
- Approximately 40 tons of NOx reduced annually
- Cost effectiveness is about \$250/ton of NOx reduced
- Large emission reductions possible because baseline engine are uncontrolled (11.5 g/bhp-hr) and LPG retrofit kits is certified at 2.5 g/bhp-hr
- Project very cost effective because of a relatively inexpensive kit (\$20,000) and large emission reductions

Cost Effective Marine Projects

	Number	Annual Statewide Tons NOx Reduced	Annual Statewide Cost Effectiveness (\$/ton)
LPG Yard Hostler Retrofits	5 (all in South Coast)	39	\$ 250
LPG Yard Hostler New Purchases	7 (all in South Coast)	13	\$ 700
Diesel Boat Retrofits	9 (all in Bay Area)	93	\$ 900
Diesel Boat Repowers	12	147	\$1,200
Diesel Tug Retrofits	9	13	\$1,300

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Mobile Source Emission Reduction Credits (MERCs)

Mobile Source Emission Reduction Credits (MERCs)

- Alternative fueled vessels can easily provide long-term emission credits used to offset new stationary source emissions

Purpose	Offset economic growth-related increased stationary emissions with reductions from mobile sources
Eligible Vessels	All vessels (ARB and local District approval required)
Project Types	All projects providing real, quantifiable and surplus reductions including repowers, retrofits, and new purchases
Incentive Amount	The incentive amount depends on among other things the market value of the emission credits
Apply to	California local Air Quality Management District (AQMD) or Air Pollution Control District (APCD)
For more information	California Air Resources Board: http://www.arb.ca.gov/msprog/mserc/mserc.htm

MERC Project Example: PG&E Generating Otay Mesa Facility (NOx Offsets)



- Typical project consists in replacing two-stroke Detroit Diesel engines with Detroit Diesel and Cummins electronically controlled engines
- MERC credits will also be generated by tug boat repowers

- Four commercial ferries repowered with new lower emitting diesel engines
- 35 tons of NOx reduced annually for 30 years
- Cost effectiveness is about \$100,000/ton to \$200,000/ton of NOx reduced



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Congestion Mitigation and Air Quality Program (CMAQ)

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- Approximately \$8 billion has been authorized for FY98-03. Funding is distributed to County Transportation Planning agencies based on attainment status and population

Purpose	Fund projects in air quality non-attainment and maintenance areas which reduce transportation-related emissions
Eligible Vessels	Projects included in the State or County Transportation Plan and/or State Implementation Plan
Project Types	Projects must provide quantifiable transportation-related emission reductions
Incentive Amount	Public agencies (cities, counties, transit operators) compete for project funding. Public/private partnerships are allowed
Apply to	State and County Transportation Planning Agencies
For more information	Federal Highway Administration: http://www.fhwa.dot.gov/environment/cmaq.htm

Congestion Mitigation and Air Quality Program (CMAQ)

- CMAQ funding has been traditionally used to fund projects such as traffic flow improvements, transit improvements, and transportation demand management strategies and not projects related to alternative fueled vessels
- The Bay Area AQMD is funding, through CMAQ, the purchase of a new ferry for the Alameda-Oakland service
- The New York Metropolitan Transportation Council is providing CMAQ funds to the Port Authority of New York and New Jersey to establish barge services that will ship freight containers to New Jersey across the Hudson River as opposed to trucking the containers across the Verrazano Narrows bridge
- The Transportation Equity Act for the 21st Century which authorizes the CMAQ funds also sets aside \$20 million per year for the construction of ferry boats and ferry terminal facilities in Alaska, New Jersey and Washington.

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Legislative Efforts

Legislative Efforts

- Many current incentive programs are the result of successful legislative efforts
- The Carl Moyer Program (AB 1368, AB 1571) was a result of the cooperative efforts of government and industry to provide a solution to air quality and transportation issues
- Similarly, the Sacramento Emergency Clean Air and Transportation Program (AB 2511), which will provide \$50 million in incentive for onroad projects in the Sacramento area, is the result of a community-based effort. \$20 million additional will be provided by CMAQ funds.
- Successful legislative efforts to create incentive programs have relied on consensus building of concerned stakeholders (regulators, equipment owners/users, and environmental groups)

6 **Summary**

Summary

- Incentives are used to offset the initial cost of cleaner technologies
- They are only available for a limited time and are gradually phased out
- It is essential to take advantage of these opportunities while they are still available, before the implementation of more stringent emission factors
- They provide a cost-effective way of buying down emissions